

## **VERTICAL CAVITY SURFACE EMITTING LASER INCLUDING INDIUM AND ANTIMONY IN THE ACTIVE REGION**

### **ABSTRACT OF THE DISCLOSURE**

Quantum wells and associated barriers layers can be grown to include nitrogen (N), aluminum (Al), antimony (Sb), phosphorous (P) and/or indium (In) placed within or about a typical GaAs substrate to achieve long wavelength VCSEL performance, e.g., within the 1260 to 1650 nm range. In accordance with features of the present invention, a vertical cavity surface emitting laser (VCSEL), can include at least one quantum well comprised of InGaAsSb; barrier layers sandwiching said at least one quantum well; and confinement layers sandwiching said barrier layers. A vertical cavity surface emitting laser (VCSEL), can also include at least one quantum well comprised of InGaAsSbN. Barrier layers can be comprised of GaAsN, GaAsP, or AlGaAs. Confinement layers can be comprised of AlGaAs. Quantum wells can include N. Quantum wells can be developed up to and including 50 Å in thickness. Quantum wells can also be developed with a depth of at least 40 meV.